

commenters and NARUC note, section 252(e)(6) appears to limit review of state commission decisions to federal district court.<sup>289</sup> Thus, each state decision could eventually lead to litigation in the federal courts, creating even more uncertainty and further delaying the benefits of competition to consumers.

## V. APPLICATION OF THE STANDARD TO INDIVIDUAL NETWORK ELEMENTS

### A. Loops

#### 1. Background

162. In the *Local Competition First Report and Order*, the Commission found that incumbent LECs must provide local loops on an unbundled basis to requesting carriers.<sup>290</sup> The Commission concluded that such access was technically feasible and would promote competition in the local exchange market.<sup>291</sup> The Commission, at that time, did not require subloop unbundling, or specify whether “dark fiber” fell within the definition of the loop.<sup>292</sup> The *Local Competition First Report and Order* also did not address the status of “inside wire” (wiring located inside the customer premises but owned by the incumbent).

163. In the *Notice*, we stated that it was our strong expectation that, under any reasonable interpretation of the “necessary” and “impair” standards of section 251(d)(2), loops would be subject to the section 251(c)(3) unbundling obligations.<sup>293</sup> The *Notice* also requested that parties discuss specific costs and analyze the availability of alternative sources of the loop facilities.<sup>294</sup>

164. In general, incumbent LECs contend that the definition of the loop should not include high-capacity loops that serve large business customers, dark fiber, inside

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<sup>289</sup> Iowa Comments at 3; Florida PSC Comments at 2-5; NARUC Comments at 3-4; Texas PUC Comments at 5.

<sup>290</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15689-90, para. 377.

<sup>291</sup> *Id.*

<sup>292</sup> *Id.* at 15695-96, paras. 390-391 (subloop unbundling). Dark fiber is defined as “[u]nused fiber through which no light is transmitted, or installed fiber optic cable not carrying a signal.” It is “dark” because it is sold without light communication transmission. The [carrier] leasing the fiber is expected to put its own electronics and signals on the fiber and make it “light.” Harry Newton, *Newton's Telecom Dictionary*, 14<sup>th</sup> ed. (Flatiron Publishing, New York, 1998) 197-98 (*Newton's Telecom Dictionary*).

<sup>293</sup> *Notice* at para. 32. (We noted that, in the *Local Competition First Report and Order*, even incumbent LECs agreed that the loop network element must be unbundled pursuant to sections 251(c)(3) and 251(d)(2) of the Act.).

<sup>294</sup> *Notice* at para 33.

wire, and loop conditioning.<sup>295</sup> State regulatory commissions and competitive LECs argue that loops should be unbundled.<sup>296</sup> The state commissions disagree among themselves as to whether or not competitive providers are impaired without access to dark fiber. They also disagree as to whether dark fiber should be included within the loop and transport unbundled network elements definitions or be unbundled as a separate network element.<sup>297</sup>

## 2. Discussion

165. We conclude that LECs must provide access to unbundled loops, including high-capacity loops, nationwide. We find that requesting carriers are impaired without access to loops, and that loops include high-capacity lines, dark fiber, line conditioning, and certain inside wire. Requiring carriers to obtain loops from alternative sources would materially raise entry costs, delay broad-based entry, and limit the scope and timeliness of the competitor's service offerings. As described below, we conclude that neither self-provisioning loops nor obtaining loops from third-party sources is a sufficient substitute that would justify excluding loops from an incumbent LEC's unbundling obligation under section 251(c)(3).

### a. Definition

166. In the *Local Competition First Report and Order*, the Commission defined the loop as "a transmission facility between a distribution frame, or its equivalent, in an incumbent LEC central office, and the network interface device at the customer premises."<sup>298</sup> The Commission also stated that the definition included, for example, two-wire and four-wire analog voice-grade loops, and two-wire and four-wire loops that are conditioned to transmit digital signals, such as xDSL.<sup>299</sup> The Commission did not, however, specify whether "dark fiber" fell within the definition of the loop.<sup>300</sup>

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<sup>295</sup> See, e.g., Ameritech Comments at 101-102; BellSouth Comments at 64; GTE Comments at 63-68; SBC Comments at 23-24; U S West Comments at 38-39.

<sup>296</sup> See, e.g., Kentucky PSC Comments at para. 3; Ohio PUC Comments at 13; Texas PUC Comments at 14; CompTel Comments at 34-35; e-Spire Joint Comments at 23; Focal Comments at 6-7; Level 3 Comments at 15; MCI WorldCom Comments at 43; Qwest Comments at 59-61.

<sup>297</sup> See, e.g., Florida PSC Comments at 8-9; Illinois Commission Comments at 15; Iowa Comments at 9.

<sup>298</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15691, para. 380.

<sup>299</sup> "xDSL" refers to the various kinds of Digital Subscriber Line service, such as ADSL (Asynchronous Digital Subscriber Line) and HDSL (High-bit-rate Digital Subscriber Line). *Id.* at n.823. The definition includes the provision of cross-connect facilities. *Id.* at 15693, para. 386.

<sup>300</sup> In the *Local Competition First Report and Order*, the Commission refrained from limiting the transmission technology that would fit the loop definition, stating only that the "definition includes, for example, two-wire and four-wire analog voice-grade loops, and two-wire and four-wire loops that are

167. We modify the definition of the loop network element to include all features, functions, and capabilities of the transmission facilities, including dark fiber and attached electronics (except those used for the provision of advanced services, such as DSLAMs) owned by the incumbent LEC, between an incumbent LEC's central office and the loop demarcation point at the customer premises.<sup>301</sup> In order to secure access to the loop's full functions and capabilities, we require incumbent LECs to condition loops. This broad approach accords with section 3(29) of the Act, which defines network elements to include their "features, functions and capabilities."<sup>302</sup> Our intention is to ensure that the loop definition will apply to new as well as current technologies, and to ensure that competitors will continue to be able to access loops as an unbundled network element as long as that access is required pursuant to section 251(d)(2) standards.

168. Termination of the Loop. The loop definition the Commission adopted in the *Local Competition First Report and Order* defined the loop as terminating at the network interface device (NID) at the customer premises.<sup>303</sup> We find the demarcation point preferable to the NID in defining the termination point of the loop because, in some cases, the NID does not mark the end of the incumbent's control of the loop facility.<sup>304</sup> Where incumbents maintain ownership and control over a portion of the loop beyond the NID, the definition of the loop as set forth by the Commission in the *Local Competition First Report and Order* may not provide the competitor with actual access to the subscriber.<sup>305</sup>

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conditioned to transmit the digital signals needed to provide services such as ISDN, ADSL, HDSL, and DS1-level signals. *Id.* at 15691, para. 380. (emphasis added). For a definition of dark fiber, see *supra* n.292.

<sup>301</sup> In other words, our revised definition retains the definition from the *Local Competition First Report and Order*, but replaces the phrase "network interface device" with "demarcation point," and makes explicit that dark fiber and loop conditioning are among the "features, functions and capabilities" of the loop. Issues regarding an incumbent LEC's obligation to afford access under section 251(c)(3) to facilities that it controls but does not own are being addressed in the *Competitive Networks Notice*.

<sup>302</sup> 47 U.S.C. 153(29).

<sup>303</sup> The network interface device (NID) is the cross-connect device used to connect loop facilities to inside wiring. 47 C.F.R. § 51.319(b)(1). Until 1990, the Commission mandated the connection of inside wiring to the Public Switched Telephone Network through a carrier-installed jack to ensure the easy disconnection of inside wire if network harm should occur, and to limit access to the protector on the carrier's side of the demarcation point. *Review of Sections 68.104 and 68.213 of the Commission's Rules Concerning Connection of Simple Inside Wiring to the Telephone Network and Petition for Modification of Section 68.213 of the Commission's Rules filed by the Electronic Industries Association*, Report and Order and Further Notice of Proposed Rulemaking, CC Docket No. 88-57, 5 FCC Rcd 4687, at para. 3 (1990).

<sup>304</sup> See, e.g. Ohio PUC Comments at 19-20; AT&T Comments at 83-85; CoreComm Comments at 35-36; MediaOne Comments at 16-19; OpTel Comments at 7-12; RCN Comments at 20-21; Teligent Comments at 2-10; WinStar Comments at 2-13.

<sup>305</sup> See CoreComm Comments at 35-36; KMC Comments at 22; OpTel Comments at 7; Letter from W. Kenneth Ferree, Attorney, OpTel, to Magalie R. Salas, Secretary, Federal Communications Commission, CC Docket Nos. 96-98 and 99-217 (filed July 22, 1999).

169. Section 68.3 of our rules defines the demarcation point as that point on the loop where the telephone company's control of the wire ceases, and the subscriber's control (or, in the case of some multiunit premises, the landlord's control) of the wire begins.<sup>306</sup> Thus, the demarcation point is defined by control; it is not a fixed location on the network, but rather a point where an incumbent's and a property owner's responsibilities meet.<sup>307</sup> The demarcation point is often, but not always, located at the minimum point of entry (MPOE), which is the closest practicable point to where the wire crosses a property line or enters a building.<sup>308</sup> In multiunit premises, there may be either a single demarcation point for the entire building or separate demarcation points for each tenant, located at any of several locations, depending on the date the inside wire was installed, the local carrier's reasonable and nondiscriminatory practices, and the property owner's preferences.<sup>309</sup> Thus, depending on the circumstances, the demarcation point may be located either at the NID, outside the NID, or inside the NID.

170. Although inside wire typically consists of junction and utility boxes, riser cable, and horizontal distribution wiring within an apartment building, it can also include the loop facility within a campus, a commercial park, or a garden apartment complex. We note that Teligent prefers the term "intra-building wiring," to emphasize that the plant in question is not always inside the customer premises, but may, especially in multiunit buildings, exist primarily within the landlord's, rather than the subscriber's, premises.<sup>310</sup> Yet even the term "intra-building wire" may suggest limitations that do not apply in some situations, because "inside" wire is often out-of-doors, as is the case at garden apartments and campuses, among other places.<sup>311</sup> Thus, although we refer to "inside wire" and "customer premises," for the sake of convenience, we acknowledge that the wire may be out-of-doors, and the "customer" may be a subscriber, a landlord, a condominium, a university, and so on.

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<sup>306</sup> 47 C.F.R. § 68.3. See, e.g., GTE Comments at 89; MGC Comments at 19-20.

<sup>307</sup> Any loop plant that exists beyond the demarcation point is, by definition, beyond the incumbent LEC's control.

<sup>308</sup> 47 C.F.R. § 68.3. ("The 'minimum point of entry' [is] either the closest practicable point to where the wiring crosses a property line or . . . enters a multiunit building or buildings.").

<sup>309</sup> See 47 C.F.R. § 68.3(b)(2) for further definition of the term "demarcation point" as it applies in multiunit installations. See also Teligent Comments at 5-6 (providing a graphic illustration of possibilities). In the *Competitive Networks Notice*, we have sought comment on how the definition of the demarcation point under Part 68 affects access to multiple tenant environments by competitive telecommunications providers, including whether an incumbent LEC's control over the loop for purposes of competitive access may be greater than its control for purposes of installation and maintenance. *Competitive Networks Notice* at paras. 65-67. Accordingly, we may subsequently refine our criteria for determining the extent of an incumbent LEC's ownership and control, and hence the termination point of the loop, in accordance with the record developed in that proceeding.

<sup>310</sup> Teligent Comments at 4, n.4.

<sup>311</sup> See, e.g., OpTel Comments at 7.

171. Defining the loop to terminate at the same point as the incumbent LEC's control over facilities that it owns, will ensure that the competitor will be able to gain access to the entire loop, including inside wire.<sup>312</sup> We note that, in our *Access to Competitive Networks* proceeding, we are seeking additional comment on the legal and technical issues arising from unbundled inside wiring and premises facilities.<sup>313</sup> We also note that Section 251(d)(2) imposes obligations only on incumbent local exchange carriers and not, for instance, on third parties (such as the owners of multi-tenant buildings). Thus, the rules adopted in this Order are not intended to give competitive service providers any additional legal rights vis-a-vis such third parties, including access to a multi-unit building over the objection of the property owner. Those issues are being addressed in other proceedings before the Commission.<sup>314</sup>

172. Conditioned Loops. We clarify that incumbent LECs are required to condition loops so as to allow requesting carriers to offer advanced services.<sup>315</sup> The terms "conditioned," "clean copper," "xDSL-capable" and "basic" loops all describe copper loops from which bridge taps, low-pass filters, range extenders, and similar devices have been removed. Incumbent LECs add these devices to the basic copper loop to gain architectural flexibility and improve voice transmission capability.<sup>316</sup> Such devices, however, diminish the loop's capacity to deliver advanced services, and thus preclude the requesting carrier from gaining full use of the loop's capabilities. Loop conditioning requires the incumbent LEC to remove these devices, paring down the loop to its basic form.

173. GTE contends that the Eighth Circuit, in the *Iowa Utils. Bd. v. FCC* decision, overturned the rules established in the *Local Competition First Report and Order* that required incumbents to provide competing carriers with conditioned loops capable of supporting advanced services even where the incumbent is not itself providing advanced services to those customers.<sup>317</sup> We disagree. Although the Eighth Circuit overturned certain rules to the extent those rules required incumbent LECs to provide access to unbundled network elements at levels of quality superior to those the incumbent LECs provide themselves, the court also expressly affirmed the Commission's determination that section 251(c)(3) requires incumbent LECs to provide modifications to

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<sup>312</sup> We discuss unbundling of inside wire as a separable subloop at Section (V)(B) *infra*.

<sup>313</sup> *Competitive Networks Notice* at para. 51.

<sup>314</sup> See, e.g., *Access to Competitive Networks: Telecommunications Services Inside Wiring*, CS Docket No. 95-189, First Report and Order and Second Further Notice of Proposed Rulemaking, 13 FCC Rcd 3659 (1997).

<sup>315</sup> See also *Advanced Services Memorandum Opinion and Order and NPRM*, 13 FCC Rcd at 24036-37, paras. 52-53.

<sup>316</sup> See Covad Reply Comments at 13-14.

<sup>317</sup> GTE Comments at 86-87; GTE Reply Comments at 72-73.

their facilities to the extent necessary to accommodate access to network elements.<sup>318</sup> We find that loop conditioning, rather than providing a “superior quality” loop, in fact enables a requesting carrier to use the basic loop. Because competitors cannot access the loop with all its native “features, functions, and capabilities” unless it has been stripped of accreted devices, we conclude that loop conditioning falls within the definition of the loop network element, and is also consistent with the Eighth Circuit opinion.

174. Dark Fiber. We also modify the loop definition to specify that the loop facility includes dark fiber.<sup>319</sup> Dark fiber is fiber that has not been activated through connection to the electronics that “light” it, and thereby render it capable of carrying communications services.<sup>320</sup> Because it is in place and easily called into service, we find that dark fiber is analogous to “dead count” or “vacant” copper wire that carriers keep dormant but ready for service. Thus, we disagree with GTE’s argument that, unlike vacant copper, dark fiber does not qualify as loop plant.<sup>321</sup> GTE maintains that extra “copper cable is installed to provide optimum flexibility” and contrasts this copper to dark fiber, which GTE terms “unused inventory.” GTE clarifies that “[t]hese fibers remain dark until they are needed.”<sup>322</sup> We find this to be a distinction without a difference, and conclude that both copper and fiber alike represent unused loop capacity. We find, therefore, that dark fiber and extra copper both fall within the loop network element’s “facilities, functions, and capabilities.”<sup>323</sup>

175. Attached Electronics. We conclude that, with the exception of Digital Subscriber Line Access Multiplexers (DSLAMs), the loop includes attached electronics,

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<sup>318</sup> *Iowa Utils Bd. v. FCC*, 120 F.3d at 813, n.33 (citing *Local Competition First Report and Order*, 11 FCC Rcd at 15602, para. 198). Covad notes that no party appealed to the Supreme Court the Eighth Circuit’s holding that § 251(c)(3) requires incumbent LECs to provide such modifications. Covad Reply Comments at 12. See also AT&T Comments at 76.

<sup>319</sup> Notice at 34 (We asked parties whether, in light of technological or commercial developments since adoption of the *Local Competition First Report and Order*, we should modify the definition of the loop to include dark fiber.).

<sup>320</sup> See Choice One Joint Comments at 25; CO Space Comments at 2; KMC Comments at 20-21.

<sup>321</sup> GTE Reply Comments at 63-64.

<sup>322</sup> *Id.* at 64.

<sup>323</sup> In designating dark fiber as a network element, we acknowledge that some facilities that the incumbent LEC currently uses to provide service may not constitute network elements (e.g. unused copper wire stored in an incumbent LEC’s warehouse). Defining all such facilities as network elements would read the “used in the provision” language of section 153(29) too broadly. Dark fiber, however, is distinct in that it is unused loop capacity that is physically connected to facilities that the incumbent LEC currently uses to provide service; was installed to handle increased capacity and can be used by competitive LECs without installation by the incumbent. Thus, we conclude that dark fiber falls within the statutory definition of a network element.

including multiplexing equipment used to derive the loop transmission capacity.<sup>324</sup> The definition of a network element is not limited to facilities, but includes features, functions, and capabilities as well.<sup>325</sup> Some loops, such as integrated digital loop carrier (IDLC), are equipped with multiplexing devices, without which they cannot be used to provide service to end users. Because excluding such equipment from the definition of the loop would limit the functionality of the loop, we include the attached electronics (with the exception of DSLAMs) within the loop definition. By contrast, and as we discuss below, we find that the DSLAM is a component of the packet switch network element.<sup>326</sup>

176. High-Capacity Loops. We disagree with incumbent LECs that high-capacity loops should be excluded from the definition of the loop.<sup>327</sup> High-capacity loops retain the essential characteristic of the loop: they transmit a signal from the central office to the subscriber, or vice versa. In a DS1 loop, for example, the attached electronics boost the wire's capacity, but the wire facility used for transmission of the traffic is indistinguishable from any other copper wire. Although it may be more profitable to serve customers over higher capacity lines, such differences do not support a modification of the loop *definition* to exclude high-capacity lines. Whether the Commission should refrain from unbundling high-capacity loops is another matter, which we discuss below in our unbundling analysis.

177. For similar reasons, we reject US West's argument that we should exclude from the definition the loop facilities that underlie private line and special access interconnection, because providing these services to competitors at lower-than-tariffed rates would "promote regulatory arbitrage and serve no valid statutory or public purpose."<sup>328</sup> The Commission has not previously found that the requirements of section 251(c)(3) are limited to any particular kind of service.<sup>329</sup> Moreover, section 251(d)(2) of the Act refers to a "... carrier seeking access to provide the *services that it seeks to*

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<sup>324</sup> See, e.g., ALTS Comments at 41-46; CompTel Comments at 32-33; MCI WorldCom Comments at 45-46. Carriers providing advanced services use DSLAMs to split voice and data traffic and route each to the appropriate destination. For discussion of DSLAMs, see *infra* Section (V)(D).

<sup>325</sup> 47 U.S.C. 153(29).

<sup>326</sup> See *infra* Section (V)(D)(2) (packet switching).

<sup>327</sup> See generally Ameritech Comments at 100-102; Bell Atlantic Comments at 37-39; Bell South Comments at 65-67, 70-71; GTE Comments at 63-70; SBC Comments at 23-25, 30; US West Comments at 36-40. See also BellSouth Comments at 64.

<sup>328</sup> US West Comments at 38-39. US West refers specifically to lines "DS1 and higher."

<sup>329</sup> See *Local Competition First Report and Order*, 11 FCC Rcd at 15679-15683, paras. 356-365. See also *CompTel v. FCC*, 117 F.3d at 1073 (upholding the Commission's decision to allow the incumbent to collect the carrier common line charge (CCLC) and 75 percent of the transport interconnection charge, until June 30, 1997.)

offer.”<sup>330</sup> We find no basis for placing a restriction on what services a carrier may offer using the loop network element. Indeed, the prospect of competition among carriers to provide services over the loop at prices that more closely reflect the provider’s costs seems to us to accord fully with Congress’s intent in passing the 1996 Act. We do not now decide whether or not this analysis may extend to the enhanced extended loop (EEL), but rather seek comment on that issue in the *Further Notice of Proposed Rulemaking*, below.<sup>331</sup>

178. Cross Connects. In the *Local Competition First Report and Order*, the Commission concluded that incumbent LECs must provide cross connect facilities between an unbundled loop and a requesting carrier’s collocated equipment.<sup>332</sup> The Commission emphasized this requirement because of its concern that incumbent LECs might have imposed unreasonable rates, terms, and conditions for such cross connect facilities in the past.<sup>333</sup> Nothing in this Order disturbs the Commission’s findings regarding cross connect facilities. In particular, we continue our policy that incumbent LECs may recover the cost of providing such facilities in accordance with our rules governing the costs of interconnection and unbundling. Charges for cross connect facilities must meet the cost-based standard provided in section 252(d)(1), and the terms and conditions of providing cross connect facilities must be reasonable and nondiscriminatory under section 251(c)(3).<sup>334</sup>

179. Because we agree with the Commission’s analysis of cross connect facilities in the *Local Competition First Report and Order*, we decline to include cross connect facilities within the definition of the loop network element.<sup>335</sup> We continue to view the cross connect as a means of interconnection with a network element, rather than as part of the network element. We require, however, that incumbents provide cross connect facilities according to sections 252(d)(1) and 251(c)(3) at any technically feasible point that a requesting carrier seeks access to the loop. We conclude that such a requirement is needed wherever a competitor seeks access to the loop, because cross connection offers a potential bottleneck, and incumbents may have the incentive to impose unreasonable rates, terms, and conditions for cross-connect facilities.

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<sup>330</sup> 47 U.S.C. § 251(d)(2) (*emphasis added*).

<sup>331</sup> See *infra* Section VII.

<sup>332</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15693, para. 386. A cross connection is defined as “[a] connection scheme between cabling runs, subsystems, and equipment using patch cords or jumpers that attach to connecting hardware on each end.” *Newton’s Telecom Dictionary* at 187.

<sup>333</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15693, para. 386.

<sup>334</sup> 47 U.S.C. §§ 252(d)(1) and 251(c)(3).

<sup>335</sup> See, e.g., ALTS Comments at 38-39; e.spire/Intermedia Comments at 23; MCI WorldCom Comments at 45-46.

**b. Proprietary Concerns Associated with the Loop**

180. In the *Local Competition First Report and Order*, the Commission concluded that the technology associated with the loop is not proprietary in nature.<sup>336</sup> Parties in this proceeding have not identified any proprietary concerns associated with unbundled loops, and we find none. We therefore apply the “impair” standard of section 251(d)(2), rather than the “necessary” standard, to determine whether loops are subject to the unbundling obligations of the Act.

**c. Unbundling Analysis for the Loop in General**

181. We require incumbent LECs to provide unbundled access to loops nationwide. The record demonstrates that lack of access to unbundled loops impairs a carrier’s ability to provide the services it seeks to offer because requiring carriers to self-provision loops would materially raise entry costs, delay broad-based entry, and limit the scope and quality of the competitor’s offerings. We conclude that neither self-provisioning loops nor obtaining loops from third-party sources is an adequate alternative for loops that a carrier can obtain from an incumbent LEC under the section 251(c) unbundling obligation. We analyze the obligation to unbundle separable elements of the loop, such as inside wire, when we discuss subloop unbundling, below. We defer a decision on whether to unbundle the high frequency portion of the loop to a further proceeding.

182. Cost and Timeliness. We agree with the argument that self-provisioning is not a viable alternative to the incumbent’s unbundled loops because replicating an incumbent’s vast and ubiquitous network would be prohibitively expensive and delay competitive entry.<sup>337</sup> We find the reasons for unbundling the loop that the Commission articulated in the *Local Competition First Report and Order* are still valid three years later. In that order, the Commission recognized that, without access to unbundled loops, competitors would need to invest immediately in duplicative facilities in order to compete for most customers, and that such investment and construction would likely delay, if not prohibit, market entry and postpone, perhaps indefinitely, the benefits of telephone competition for consumers. Moreover, the Commission found that without access to unbundled loops, competitive LECs would be required to sink a large initial investment in loop facilities before they had a customer base large enough to justify such an expenditure, thereby increasing the risk of entry and raising the competitive LEC’s cost of capital.<sup>338</sup> By contrast, permitting a competitor to purchase unbundled loops from the

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<sup>336</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15694, para. 388.

<sup>337</sup> AT&T Comments at 63-64; Covad Comments at 32; Focal Comments at 6; Qwest Comments at 59-61; RCN Comments at 15; Sprint Comments at 29. *See also* MCI WorldCom Comments at 43 (loops comprise 44% of ILEC network investment); *Local Competition First Report and Order*, 11 FCC Rcd at 15690, para. 378 n.818 (Local loop plant comprises approximately \$109 billion.).

<sup>338</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15690, para. 378.

incumbent LEC allows the competitive LEC to build facilities gradually, and to deploy loops for its customers where it is efficient to do so.<sup>339</sup>

183. Nothing in the record of this proceeding leads us to a different conclusion. To the contrary, we find that, as a practical matter, building loop plant continues to be, in most cases, prohibitively expensive and time-consuming. Because of the size of their networks, incumbent LECs enjoy advantages of scope that competitors cannot replicate.<sup>340</sup> We find that it would be unreasonable to expect a competitive LEC to invest the large sums of capital needed to build out ubiquitous loop plant before the competitive LEC has established a substantial and secure customer base. Unlike switches, which can be scaled to need, relocated if the business fails to develop, and which can accommodate a fluctuating customer base, much of the loop is often dedicated to a particular location. In addition, if the competitive LEC loses the customer back to the incumbent or to another competitor, the competitive LEC would probably bear the full loss of its sunk investment in the redundant loop.<sup>341</sup>

184. We disagree with incumbents' assertions that we should not unbundle high-capacity loops because competitive LECs have successfully self-provisioned loops to certain large business customers. According to these commenters, the call concentration and revenue potential of "high-capacity" lines (DS1 and higher) make self-provisioning high-capacity lines an economically viable alternative to the incumbent LECs' unbundled high-capacity loops.<sup>342</sup> Building out any loop is expensive and time-consuming, regardless of its capacity.<sup>343</sup> That some competitive LECs, in certain instances, have found it economical to serve certain customers using their own loops suggests to us only that carriers are unimpaired in their ability to serve those particular customers. This evidence tells us nothing about the customer the competitor would like to serve but cannot because the cost of building a loop from the customer premises to the competitive LEC's switch is prohibitive.

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<sup>339</sup> *Id.* at 15690, para. 378.

<sup>340</sup> See Illinois Commission Comments at 11-12; ALTS Comments at 36-37; AT&T Comments at 62-66; CompTel Comments at 34-35; Covad Comments at 32; Focal Comments at 6-7; MCI WorldCom Comments at 43; Sprint Reply Comments at 6.

<sup>341</sup> In theory, the entrant could lease the loop to another competitive LEC, if one exists, but the other competitor might have its loop needs met by the incumbent LEC.

<sup>342</sup> See Ameritech Comments at 101-102; Bell Atlantic at 37-39; SBC Comments at 23-25; U S West comments at 36-40. Several of these parties cite the *USTA UNE Report* at III-3 and III-16 (stating that competitive LEC fiber serves 15% of all commercial office buildings and between 9% and 18% of all business lines from dense wire centers with collocation by one or more competitive LECs.).

<sup>343</sup> For example, assuming the availability of existing conduit and pole space, the estimated cost for New England Voice & Data to install its own fiber is \$46,680 per mile for a 96 fiber cable. Letter from Thomas Jones, on behalf of New England Voice & Data, LLC, to Magalie Roman Salas, Secretary, Federal Communications Commission, CC Docket No. 96-98, at 6 (filed July 15, 1999).

185. For similar reasons, we reject BellSouth's proposal that we not require incumbent LECs to unbundle larger business loops in Special Access Pricing zones 1 and 2.<sup>344</sup> Because of the expense inherent in building loops, we find that it would be extremely difficult for competitive LECs to overbuild the ubiquitous loop plant that the incumbents have built up over decades, even to serve businesses in urban districts. The enormous sunk investment required to install loops would inevitably lead to competition in patches, rather than the seamless competitive service of a fully competitive market. Moreover, we find that using Special Access Pricing zones, as recently modified by the Commission, would provide incumbent LECs with discretion to define their own loop unbundling obligations.<sup>345</sup> We agree with MCI WorldCom that the Special Access Pricing zone approach would grant incumbent LECs latitude to "change their methodologies for defining zones to upset their competitor's business plans."<sup>346</sup> We find that premising an incumbent LEC's loop unbundling obligation on a geographic boundary defined, to a large degree, by the incumbent LEC itself could allow an incumbent LEC to minimize its unbundling obligation, and would not respond to a requesting carrier's need for access to unbundled loops.

186. In addition to the large costs of building loop plant, we agree with commenters in this phase of the proceeding that overbuilding the incumbent LEC's loops would embroil the competitor in lengthy rights-of-way disputes, and would require the unnecessary digging up of streets.<sup>347</sup> Thus, we find that even if competitors were able to finance the replication of the incumbents' loop plant, construction of new facilities would – at the least – materially delay competitors' ability to bring their services to consumers. Such delays would frustrate the competitor's ability to offer timely service to prospective

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<sup>344</sup> BellSouth Comments at 64-66; BellSouth Reply Comments at 37-38.

<sup>345</sup> Incumbent LECs generally proceed through a three step process to assign central offices to zones within a given study area. In the first step, an incumbent LEC ranks its wire centers in order of decreasing traffic density, based on some measure of density chosen by the incumbent LEC. In the second step, the incumbent LEC sets breakpoints within the zone density ranking to partition the wire centers into zones and finally, an incumbent LEC further adjusts the zones as it sees fit, based on geographic contiguity or community of interest reasons. See *Expanded Interconnection with Local Telephone Company Facilities*, CC Docket No. 91-141, *Amendment of the Part 69 Allocation of General Support Facility Costs*, CC Docket No. 92-222, *Report and Order and Notice of Proposed Rulemaking*, 7 FCC Rcd 7369 (1992) (*Expanded Interconnection Order*), vacated in part and remanded, *Bell Atlantic v. FCC*, 24 F.3d 1441 (1994); First Reconsideration, 8 FCC Rcd 127 (1993); Second Reconsideration, 8 FCC Rcd 7341 (1993); Second Report and Order, 8 FCC Rcd 7374 (1993); Memorandum Opinion and Order, 9 FCC Rcd 5154 (1994), remanded, *Pacific Bell v. FCC*, 81 F.3d 1147 (1996); 47 C.F.R. § 61.38(b)(4).

<sup>346</sup> MCI WorldCom argues that where a requesting carrier plans to purchase unbundled [elements], the incumbent LEC could change its methodology for ranking central office traffic density in such a way that the central office changed zones, and the incumbent LEC was no longer required to offer the [element] to requesting carriers. See Letter from Chuck Goldfarb, Director, Law and Public Policy MCI WorldCom, to Larry Strickling, Chief, Common Carrier Bureau, CC Docket No. 96-98, at 7 (filed August 9, 1999).

<sup>347</sup> See, e.g., AT&T Comments at 63-64; Focal Comments at 6; Qwest Comments at 60.

customers. Although competitive LECs have successfully constructed loops in some circumstances, we find that the cost, risk, disruption, and delay of self-provisioning loop plant would, for many consumers, foreclose the benefits of competition.<sup>348</sup>

187. Moreover, in the *Local Competition First Report and Order*, the Commission specified that the definition of the loop includes various grades of loops to allow transmission of digital signals needed to provide multiple services and DS1-level signals.<sup>349</sup> The Commission reasoned that the ability to offer various functions in competition with incumbent LECs could benefit small entities serving niche markets.<sup>350</sup> We continue to believe that access to these high-capacity lines is necessary for ubiquitous deployment of high-speed services, including high-speed Internet access. We therefore agree with competitive LECs that failing to assure access to high-capacity loops would impair their ability to provide the services that they seek to offer in broadband service markets.<sup>351</sup>

188. Ubiquity and Quality. We disagree with parties that argue that mobile telephones and fixed wireless offer an alternative to the incumbent's loop, and that loops therefore should not be unbundled.<sup>352</sup> Although we find these technologies promising, we conclude that they are not yet viable alternatives to the incumbent's wireline loop facilities. In particular, we find that alternative loop technologies are not as widespread as the incumbent's ubiquitous network. These alternatives do not offer the same functionality as wireline service, and the data capabilities of these mobile services are generally inferior to wireline loops' data transmission capabilities. Cellular and PCS telephone footprints, though expanding, are not ubiquitous. Indeed, millions of Americans are not yet served by mobile wireless carriers.<sup>353</sup> Moreover, the sound quality

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<sup>348</sup> See ALTS Reply Comments at 18-20; Level 3 Reply Comments at 3; RCN Reply Comments at 6; Qwest Reply at 50.

<sup>349</sup> In the *Local Competition First Report and Order*, the Commission stated that its definition of the loop "... includes, for example ... DS1-level signals." *Local Competition First Report and Order*, 11 FCC Rcd 15691 at para. 380.

<sup>350</sup> *Id.* at 15691, para. 380.

<sup>351</sup> See, e.g., CompTel Comments at 32-34; e.spire Joint Reply Comments at 16; RCN Comments at 16.

<sup>352</sup> Ameritech Comments at 103-105; Bell Atlantic Comments at 36-39; BellSouth Comments at 67-75; GTE Comments at 66-67; SBC Comments at 25-30; US West Comments at 37.

<sup>353</sup> See AT&T Comments at 67-72; Illinois Commission Comments at 11; ALTS Comments at 37; Level 3 Comments at 15.

of cellular and PCS service is not always equal to wireline service.<sup>354</sup> Fixed wireless cannot yet offer more than four lines, or high-speed Internet connection.<sup>355</sup>

189. We also disagree with the incumbent LECs' argument that cable television service offers a viable alternative to the incumbent's unbundled loop.<sup>356</sup> Cable service is largely restricted to residential subscribers, and generally supports only one-way service, not the two-way communications telephony requires.<sup>357</sup> Moreover, we conclude that declining to unbundle loops in areas where cable telephony is available would be inconsistent with the Act's goal of encouraging entry by multiple providers. Given that neither mobile nor fixed wireless can yet replace wireline service, if we were to take the incumbents' approach, consumers might be left to choose between only the cable company and the incumbent LEC.

190. Loops Capable of Providing High-Speed Data Services. We conclude that permitting incumbents to deny access to basic loops stripped of accreted devices, *i.e.*, "conditioned" loops, would preclude the ability of competitors to offer high-speed data services. Such unencumbered copper wire is necessary for requesting carriers to provide most types of xDSL service.<sup>358</sup> While some "flavors" of xDSL can be provided over loops with a limited number of impediments, as a general rule the quality of such service – particularly the speed – is significantly diminished, compared to the service provided over unencumbered wires.<sup>359</sup> DSL-capable loops provide end users with broadband data transmission, which allows rapid access to the Internet.<sup>360</sup> Unbundling basic loops, with their full capacity preserved, allows competitors to provide xDSL services. This in turn will foster investment, innovation, and competition in the local telecommunications

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<sup>354</sup> AT&T Comments at 67-69. Covad points out that xDSL high-speed data service cannot be provided over cellular or PCS. Covad Reply Comments at 8.

<sup>355</sup> AT&T Comments at 69-70.

<sup>356</sup> See, Ameritech Comments at 103-05; Bell Atlantic Comments at 36; BellSouth Reply Comments at 38-39; GTE Comments at 68-70; SBC Comments at 26-28; US West Comments at 37-38.

<sup>357</sup> AT&T Comments at 70-72.

<sup>358</sup> See, *e.g.*, Covad Reply Comments at 14; NorthPoint Comments at 14. As we explained in our recent *Advanced Services First Report and Order and FNPRM*, xDSL technology provides multiple benefits to the consumer that cannot be achieved with traditional analog transmission. The use of xDSL modems allows transmission of data over the copper loop at vastly higher speeds than can be achieved with analog data transmission. Moreover, combining xDSL technology with packet switching permits more efficient use of the network because information generated by multiple users can be sent over a telecommunications facility that in a circuit-switched environment may be dedicated to only one customer for the duration of a call. In addition, the customer can potentially make ordinary voice calls over the public switched network at the same time he or she is using the same line for high-speed data transmission. *Advanced Services First Report and Order and FNPRM*, 14 FCC Rcd at 4766-67, paras. 9-10.

<sup>359</sup> *Newton's Telecom Dictionary* at 38-39.

<sup>360</sup> *Advanced Services First Report and Order and FNPRM*, 14 FCC Rcd at 4767, para. 10.

marketplace. Without access to these loops, competitors would be at a significant disadvantage, and the incumbent LEC, rather than the marketplace, would dictate the pace of the deployment of advanced services.<sup>361</sup> We also note that the availability of conditioned loops enables competitors to deploy xDSL service beyond the major metropolitan areas.<sup>362</sup> Finally, we note our obligation under section 706 to encourage the deployment of advanced services by, among other means, promoting competition in the telecommunications market.<sup>363</sup>

191. As the Commission stated in the *Local Competition First Report and Order*, requiring incumbents to provide conditioned loops will, in some instances, require the incumbent LEC to take affirmative steps to enable requesting carriers to provide services that the incumbent does not currently provide.<sup>364</sup> We now clarify that we require the incumbent to provide loops with all their capabilities intact, that is, to provide conditioned loops, *wherever* a competitor requests, even if the incumbent is not itself offering xDSL to the end-user customer on that loop. Thus, incumbent LECs cannot refuse a competitive LEC's request for conditioned loops on the grounds that they themselves are not planning to offer xDSL to that customer.

192. In the *Local Competition First Report and Order*, the Commission also stated that requesting carriers would compensate the incumbent LECs for the cost of conditioning the loop.<sup>365</sup> Covad and Rhythms argue that, because loops under 18,000 feet generally should not require devices to enhance voice-transmission, the requesting party should not be required to compensate the incumbent for removing such devices on lines of that length or shorter.<sup>366</sup>

193. We agree that networks built today normally should not require voice-transmission enhancing devices on loops of 18,000 feet or shorter.<sup>367</sup> Nevertheless, the devices are sometimes present on such loops, and the incumbent LEC may incur costs in

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<sup>361</sup> See, Covad Comments at 36-37. Covad states that Bell Atlantic makes conditioned loops available only when Bell Atlantic seeks to provide ADSL service to end users, thus holding competitive LEC expansion plans hostage until Bell Atlantic is ready. Covad Comments at 36, n.63.

<sup>362</sup> See, e.g., Covad Comments at 36.

<sup>363</sup> 47 U.S.C. § 706(a).

<sup>364</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15692, para. 382.

<sup>365</sup> *Id.*

<sup>366</sup> Covad Comments at 42-43; Rhythms Reply Comments at 21.

<sup>367</sup> See generally *Bellcore Notes on the Network, Loop Transmission*, ch.7.15, (Telcordia, 1997); Regis J. Bates and Donald Gregory, *Voice and Data Communications Handbook Signature Edition*, (McGraw-Hill, New York, 1997), at 76-77.

removing them. Thus, under our rules, the incumbent should be able to charge for conditioning such loops.<sup>368</sup>

194. We recognize, however, that the charges incumbent LECs impose to condition loops represent sunk costs to the competitive LEC, and that these costs may constitute a barrier to offering xDSL services. We also recognize that incumbent LECs may have an incentive to inflate the charge for line conditioning by including additional common and overhead costs, as well as profits. We defer to the states to ensure that the costs incumbents impose on competitors for line conditioning are in compliance with our pricing rules for nonrecurring costs.<sup>369</sup>

195. In addition, we agree with commenters that argue that incumbent LECs must provide "trouble reports" to the competitive LECs for any function or capability of the accessed loop element, and that the incumbent may not limit such reports to voice-transmission trouble only.<sup>370</sup> Not knowing whether or not the accessed line is functioning properly impairs a competitive LEC's ability to provide service, because subscribers may tend to blame the new competitor, rather than the familiar incumbent, for any lapse or degradation of service. Thus, we conclude that, in so far as it is technically feasible, the incumbent must test and report trouble on conditioned lines, if requested by the competitor, for all of the line's features, functions, and capabilities, and may not restrict its testing to voice-transmission only.

196. Dark Fiber. We agree with commenters that argue that, because dark fiber provides high transmission capabilities at relatively low cost, unbundling dark fiber is essential for competition in the provision of advanced services.<sup>371</sup> We reject the incumbents' reasoning that, because competitive LECs have installed lit fiber to certain high-volume customers, they could also install their own dark fiber, and therefore are not impaired without access to the incumbent's dark fiber.<sup>372</sup> As with other loops, we decline to infer from competitive LEC self-provisioning in certain circumstances that, as a general matter, the expense and delay involved in laying fiber do not impair the ability of

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<sup>368</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15692, para. 382.

<sup>369</sup> 47 C.F.R. § 51.507(e). *See generally* 47 C.F.R. §§ 51.501 *et seq.*; *Local Competition First Report and Order*, 11 FCC Rcd at 15875-15876, paras. 749-751.

<sup>370</sup> MGC Reply Comments at 11.

<sup>371</sup> Illinois Commission Comments at 15; Iowa Comments at 9; Cable & Wireless Comments at 34; CO Space Comments at 7; GSA Comments at 7; Waller Creek Comments at 17. *See also* Texas PUC Comments at 16; KMC Comments at 21. New England Voice & Data states that fiber loops are particularly necessary to bring competition in advanced services to the residential market. New England Voice & Data Comments at 9-10.

<sup>372</sup> GTE Comments at 32; US West Comments at 39-40.

entrants and other competitive LECs to provide the services they seek to offer.<sup>373</sup> We see no reason to distinguish dark fiber from our general unbundling analysis for loops.

197. US West argues that competitors do not need the incumbent LECs' fiber because a wholesale market exists in loop fiber.<sup>374</sup> We find, however, that the nascent wholesale market in fiber loop facilities is not yet extensive enough for us to conclude that competitors are not impaired without access to incumbent LECs' unbundled dark fiber loops.<sup>375</sup> We also agree with the argument that unbundled loops, including fiber, allow competitive LECs to build out their networks gradually.<sup>376</sup> By supplementing their own facilities with unbundled fiber loops, a competitive LEC can offer advanced services ubiquitously and not limit its service offering to small areas of concentrated demand.<sup>377</sup>

198. Because fiber is currently a more significant component of interoffice transport than the loop network element, we discuss aspects of dark fiber common to both elements when we discuss interoffice transport below.<sup>378</sup> We note here, however, that GTE raises concerns that incumbents, because of their carrier-of-last-resort obligations, have a special need for fiber reserves.<sup>379</sup> As we explain in greater detail below, we find these concerns exaggerated, because the capacity of fiber can be increased many fold simply by increasing the power of the electronics that light it. We find, therefore, that a shortage of fiber capacity caused by unbundling is highly unlikely.

199. In addition, GTE and the Telecommunications Industry Association argue that requiring incumbent LECs to unbundle fiber will reduce their incentive to build fiber loops in the first place.<sup>380</sup> We remain skeptical that this is the case, because incumbents face loop unbundling obligations no matter which technology they deploy. We note,

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<sup>373</sup> See New England Voice & Data Comments at 14-15.

<sup>374</sup> US West Comments at 39-40.

<sup>375</sup> New England Voice & Data states that although Neon, NEES, and C2C offer fiber in the Northeast, they do not offer fiber on a ubiquitous basis, and thus are not a readily available, reasonable substitute for unbundled dark fiber. New England Voice & Data Comments at 13.

<sup>376</sup> RCN Comments at 15.

<sup>377</sup> New England Voice & Data Comments at 9-10. New England Voice & Data states that without unbundled dark fiber loops, its ability to offer advanced services would be limited to approximately two miles ("about 12,000") from the central office. New England Voice & Data Comments at 10.

<sup>378</sup> See *infra* Section (V)(E).

<sup>379</sup> GTE Comments at 83-84.

<sup>380</sup> GTE Comments at 83-84; Letter from Derek R. Khlopin, Regulatory Counsel, Telecommunications Industry Association, to Magalie R. Salas, Secretary, Federal Communications Commission, CC Docket No. 96-98, Attachment at 4-12 (filed Aug. 2, 1999) (stating that incumbent LECs continue to build copper loop facilities even though fiber could be deployed at no additional cost, because, according to TIA, of being required to unbundle new fiber facilities.).

however, that the Texas commission has already established moderate restrictions governing the availability dark fiber.<sup>381</sup> We do not wish to disturb the reasonable limitations and technical parameters for dark fiber unbundling that Texas or other states may have in place. If incumbent LECs are able to demonstrate to the state commission that unlimited access to unbundled dark fiber threatens their ability to provide service as a carrier of last resort, state commissions retain the flexibility to establish reasonable limitations governing access to dark fiber loops in their states.

200. Goals of the Act. We conclude that access to the full capabilities of incumbent LECs' loop plant nationwide will further the goals of the Act. Requiring access to unbundled loops will promote the rapid development of competition and bring the benefits of competition to greater numbers of consumers. Access to unbundled loops will also encourage competition to provide broadband services. We are convinced that greater, not fewer, options for procuring loops will facilitate entry by competitors, and that Congress intended for competitors to have these options available.<sup>382</sup> We find that the benefits of uniform loop unbundling outweigh the costs of creating a patchwork regime in which incumbents will seek to litigate whether particular loops should be unbundled or where an alternative to the incumbent LEC's loop is arguably substitutable. For these reasons, incumbent LECs must provide unbundled access to their loop network element nationwide.

201. Spectrum Unbundling. A number of parties request that the Commission identify loop spectrum as a separate unbundled network element.<sup>383</sup> In particular, they argue that requesting carriers need access to the high-frequency loop spectrum on an unbundled basis in order to provide advanced telecommunications services, including xDSL. We decline, at this time, to identify loop spectrum as a separate unbundled network element. In the *Advanced Services First Report and Order and FNPRM*, we will consider whether the high-frequency spectrum of the loop qualifies as an unbundled network element and the operational issues associated with such unbundling.<sup>384</sup> We believe that the record developed in that proceeding more fully addresses the issues associated with spectrum unbundling, and we therefore decline to address those issues in this proceeding.

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<sup>381</sup> See Texas PUC Comments at 16-18.

<sup>382</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15718-15719, para 441.

<sup>383</sup> Covad Reply Comments at 9-11; Network Access Solutions Comments at 20-26; NorthPoint Comments at 14-16; Rhythms Comments at 16-18; Rhythms Reply Comments at 25-28.

<sup>384</sup> *Advanced Services First Report and Order and FNPRM*, 14 FCC Rcd at 4806-12, paras. 96-107.

## B. The Subloop

### 1. Background

202. In the *Local Competition First Report and Order*, the Commission declined to identify the feeder, feeder/distribution interface (FDI), and distribution components of the loops as individual network elements.<sup>385</sup> The Commission noted, however, that subloop unbundling could provide competitors flexibility in deploying some portions of loop facilities, while elsewhere relying on the incumbent LEC's facilities. In addition, the Commission noted that carriers would need access at points along the loop closer to the customer premises to provide some high bandwidth services, such as ADSL.<sup>386</sup> The Commission also found that, although the record presented evidence mainly of logistical, rather than technical, impediments to subloop unbundling, proponents of subloop unbundling did not address technical issues raised by incumbent LECs.<sup>387</sup> The Commission stated that it would revisit subloop unbundling when the record on the issue had been more fully developed.<sup>388</sup>

203. In the *Notice*, we sought comment on whether, due to technological changes, we should require subloop unbundling at the remote terminal or at other points within the incumbent LEC's network. We sought comment on whether to unbundle incumbent-owned facilities on the end-user side of the NID. We asked commenters to apply the "necessary" and "impair" standards and to discuss costs and availability on an element-by-element basis. We also asked those commenters requesting further unbundling of the local loop to discuss possible alternatives.<sup>389</sup>

204. Competitive LECs argue generally that they need unbundled access to subloop elements in order to: (1) connect their own facilities to the incumbent's inside wire; (2) access loops that an incumbent LEC provides over integrated digital loop carrier (IDLC) technology; and (3) provide advanced services over xDSL.<sup>390</sup> These commenters

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<sup>385</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15695-15696, paras. 390-391.

<sup>386</sup> *Id.* at 15696, para. 390.

<sup>387</sup> *Id.* at 15696, para. 391.

<sup>388</sup> *Id.*

<sup>389</sup> *Notice* at para. 33.

<sup>390</sup> See, e.g., Choice One Joint Comments at 21; Inline Comments at 3-4; Level 3 Comments at 17-18; RCN Comments at 22-23. Digital Loop Carrier (DLC) systems digitally encode and aggregate, i.e. "multiplex," the traffic from subscribers' loops into DS1 signals or higher for more efficient transmission or more extended range than traditionally permitted by copper loops. The analog signals are carried from customer premises to a remote terminal (RT) where they are converted to digital, mixed with other signals, and carried, generally over fiber, to the LEC central office. Integrated Digital Loop Carriers (IDLC) establish

argue that they are also financially burdened if they must pay for an entire loop when they need to use only a portion of it.<sup>391</sup> Incumbents argue generally that competitors are not impaired without access to subloops; that technical and logistical impediments prevent subloop unbundling; and that network architectures differ too broadly to adopt an unbundling rule that applies nationwide.<sup>392</sup> Several state commissions argue that subloop unbundling requires a case-by-case analysis that the states are in the best position to perform.<sup>393</sup> For example, Texas states that subloop unbundling meets the “impair” standard of section 251(d)(2) and requires subloop unbundling at the remote terminal.<sup>394</sup>

## 2. Discussion

205. We find that lack of access to unbundled subloops materially diminishes a requesting carrier’s ability to provide services that it seeks to offer. We also conclude that access to subloop elements is likely to be the catalyst that will allow competitors, over time, to deploy their own complementary subloop facilities, and eventually to develop competitive loops. Lack of access to subloops discourages competitive LECs from attempting to combine their own feeder plant with the incumbent’s distribution plant to minimize their reliance on the incumbents’ facilities. We also find that lack of unbundled access to the incumbent’s subloops would preclude competitors from offering some broadband services. Accordingly, we conclude that incumbent LECs must provide unbundled access to subloops nationwide, where technically feasible.

### a. Definition of the Subloop

206. We define subloops as portions of the loop that can be accessed at terminals in the incumbent’s outside plant. An accessible terminal is a point on the loop where technicians can access the wire or fiber within the cable without removing a splice case to

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a direct, digital interface with the switch at the LEC central office, which makes it difficult, or even impossible, for competitors to access individual loops at that location. “xDSL” refers to Digital Subscriber Loop; the lower case “x” is a place holder for the several versions, or “flavors” of DSL technology. DSL modems allow transmission of data over the copper loop at vastly higher speeds than can be achieved with analog data transmission. In addition, customers using xDSL can make ordinary voice calls while using the line for high-speed data transmission. xDSL cannot work over fiber, and it generally requires a “clean” (i.e., conditioned) copper loop.

<sup>391</sup> See, e.g., Ohio PUC Comments at 20.

<sup>392</sup> See, e.g., GTE Comments at 87-89; SBC Comments at 30-31.

<sup>393</sup> See, e.g., California PUC Comments at 9-10 (Commission should establish guidelines, but allow parties to negotiate and states to arbitrate specific terms); Florida PSC Comments at 8 (Subloop unbundling should be determined case-by-case); Ohio PUC Comments at 16-18 (States should develop policy on an ongoing basis as technology/business evolves).

<sup>394</sup> Texas PUC Comments at 15-16. Texas also describes limitations it imposes to safeguard the integrity of the network. *Id.* at 16.

reach the wire or fiber within.<sup>395</sup> These would include a technically feasible point near the customer premises, such as the pole or pedestal,<sup>396</sup> the NID (which we discuss below),<sup>397</sup> or the minimum point of entry to the customer premises (MPOE). Another point of access would be the feeder distribution interface (FDI), which is where the trunk line, or “feeder,” leading back to the central office, and the “distribution” plant, branching out to the subscribers, meet, and “interface.” The FDI might be located in the utility room in a multi-dwelling unit, in a remote terminal, or in a controlled environment vault (CEV).<sup>398</sup> We acknowledge that some FDIs are more accessible than others; utility rooms are generally more spacious than vaults. A third point of access is, of course, the main distribution frame in the incumbent’s central office.<sup>399</sup>

207. We believe that a broad definition of the subloop that allows requesting carriers maximum flexibility to interconnect their own facilities at these points where technically feasible will best promote the goals of the Act. Access to portions of the loop element at these points, *i.e.*, access to the subloop, will facilitate rapid development of competition, encourage facilities-based competition, and promote the deployment of advanced services. Our intention is to ensure that the subloop definition will apply to new as well as current technologies, and to ensure that competitors will continue to be able to access subloop unbundled network elements as long as that access is required pursuant to section 251(d)(2) standards.

#### **b. Proprietary Concerns Associated with Subloops**

208. The record does not indicate, nor do commenters argue, that subloops are proprietary. Moreover, we do not discern any copyright, patent, or trademark or trade secrecy implications to subloop unbundling. We therefore apply the “impair” standard of

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<sup>395</sup> Accessible terminals contain cables and their respective wire pairs that terminate on screw posts. This allows technicians to affix cross connects between binding posts of terminals collocated at the same point. Terminals differ from splice cases, which are inaccessible because the case must be breached to reach the wires within. For a discussion of outside plant, *see* Green, James Harry, *The Irwin Handbook of Telecommunications*, McGraw Hill, New York (3<sup>rd</sup> Ed. 1997), at ch. 6.

<sup>396</sup> The pole or pedestal is where the distribution connects to the “drop.” The drop is the dedicated wire connecting the subscriber to the network.

<sup>397</sup> In the *Local Competition First Report and Order*, the Commission defined the NID as a cross-connect device used to connect loop facilities to inside wiring. *Local Competition First Report and Order*, 11 FCC Rcd at 15697, para. 392, n.852.

<sup>398</sup> Controlled environments are necessary to protect the electronic devices, such as the multiplexing equipment on IDLC lines, or DSLAMs. The controlled environment is known as a “controlled environment vault” (CEV) if it is located below ground, and as a “hut” if it is located above ground. If the FDI is in a remote terminal in a utility room, there may be no distribution or drop, and the loop may go directly from the feeder to inside wire.

<sup>399</sup> We note that even central offices can present feasibility issues, as when they are filled to capacity, or when certain lines, such as IDLC, cannot be accessed at that point, but must be accessed closer to the end user.

section of 251(d)(2)(B) to determine whether subloops are subject to the unbundling requirements of the Act.

**c. Unbundling Analysis for Subloops**

209. We conclude that incumbent LECs must provide unbundled access to subloops. Applying our unbundling analysis, we conclude that lack of access to unbundled subloops at technically feasible points throughout the incumbent's loop plant will impair a competitor's ability to provide services that it seeks to offer. We agree with commenters that self-provisioning subloop elements, like the loop itself, would materially raise entry costs, delay broad-based entry, and limit the scope and quality of the competitive LEC's service offerings.<sup>400</sup> In addition, we find that access to subloop elements promotes self-provisioning of part of the loop, and thus will encourage competitors, over time, to deploy their own loop facilities and eventually to develop competitive loops where it is cost efficient to do so.

210. We clarify that "technically feasible points" would include a point near the customer premises, such as the point of interconnection between the drop and the distribution cable, the NID, or the MPOE. Such access would give competitors unbundled access to the inside wire subloop element, in cases where the incumbent owns and controls wire inside the customer premises. It would also include any FDI, whether the FDI is located at a cabinet, CEV, remote terminal, utility room in a multi-dwelling unit, or any other accessible terminal.

211. Cost and Timeliness. We agree with commenters that loop facilities, including subloop elements, are the most time-consuming and expensive network element to duplicate on a pervasive scale, and that the cost of self-provisioning subloops can be prohibitively expensive.<sup>401</sup> Self-provisioning subloops would require requesting carriers to incur significant sunk costs prior to offering services to end users.<sup>402</sup> Requiring competitors to expend such sums would, at a minimum, delay entry and thus postpone the benefits of competition for consumers.<sup>403</sup>

212. We are not persuaded by GTE's argument that, because the whole loop is an acceptable substitute, a competitor is not impaired without access to the subloop.<sup>404</sup> First,

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<sup>400</sup> See, e.g., ALTS Comments at 46-48; Choice One Joint Comments at 21; CoreComm Comments at 33-35; Level 3 Comments at 17-18; NorthPoint Comments at 16; OpTel Comments at 6-7.

<sup>401</sup> See, e.g., ALTS Comments at 37-38; AT&T Comments at 63-64; Focal Comments at 6-7; Level 3 Comments at 15; MCI WorldCom Comments at 43-44; Qwest Comments at 59-61; RCN Comments at 15. See also *Local Competition First Report and Order* 11 FCC Rcd at 15690, para. 378.

<sup>402</sup> *Local Competition First Report and Order*, 11 FCC Rcd at 15690, para. 378.

<sup>403</sup> *Id.*

<sup>404</sup> GTE Comments at 86-87

as we explain below, the undivided loop does not always afford competitors access to subscribers, as is the case with IDLC loops.<sup>405</sup> Also, as a rule, requesting carriers that supply their own facilities cannot afford to pay twice – first for the facilities they self-provision, and again for the incumbent's loop, including the portion that they do not utilize.<sup>406</sup> We agree with the Illinois Commission that unbundling subloops provides greater efficiency for the requesting carrier because the carrier will not have to buy the entire loop to interconnect its own facilities with wiring on the customer premises.<sup>407</sup> If competing carriers that need only a portion of the loop must either pay for the entire loop or forego access to that loop altogether, many consumers will be denied the benefits of competition.

213. GTE contends that possible rights-of-way, zoning, power supply, and similar alleged impediments should prevent us from requiring the incumbent to provide loop sub-elements on an unbundled basis.<sup>408</sup> We assume that GTE is referring to potential obstacles that the requesting carrier may encounter from cities, counties, electric power companies, and similar third parties when it seeks to interconnect its equipment at subloop access points. We find that such obstacles, however, to the extent they develop, are for the competitive LEC to resolve with the municipality or utility. Such obstacles are not relevant to our determination of whether the competitor is impaired without unbundled access to the incumbent's subloop elements, and do not absolve the incumbent from its obligation to provide unbundled access to those elements.

214. Impact on Network Operations. In order to encourage the development of facilities-based competition, requesting carriers must be able to interconnect their networks with the incumbent's network facilities that are designed to provide similar services.

215. First, if those competitors that are attempting to rely primarily on their own facilities are unable to interconnect near the customer premises, the end users those competitors target would have to forego the benefits of competition and new technology those competitors offer.<sup>409</sup> We agree with several state regulatory commissions that argue that, to the extent that requesting carriers are denied flexibility in connecting their facilities to the local loop, these carriers are impaired from developing their own network

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<sup>405</sup> Choice One Joint Comments at 21; CoreComm Comments at 34.

<sup>406</sup> See Ohio PUC Comments at 20 (stating that it is uneconomical for competitive LECs to purchase an entire loop just to obtain access to the riser cable.) See also MCI WorldCom Comments at 44-45.

<sup>407</sup> Illinois Commission Comments at 14-15.

<sup>408</sup> GTE Comments at 88-89.

<sup>409</sup> See, e.g., OpTel Comments at 7-8; Teligent Comments at 7-8; WinStar Comments at 2-3, 5-

infrastructure.<sup>410</sup> In those instances where competitive carriers are able to self-provision a portion of the loop, lack of access to the part of the incumbent's loop they need could impede the competitors' ability to develop their own network architecture and provide new service offerings. On the other hand, the gradual self-provisioning that such access encourages could lead, in time, to conditions that would permit the eventual elimination of the loop element from the unbundling obligations of the Act.

216. For example, wireless providers may require only the final leg of loop distribution plant before the wire passes to customer control at the demarcation point.<sup>411</sup> In particular, a facilities-based provider's ability to offer service in a multi-unit building or campus may be severely impaired if it must install duplicative inside wiring.<sup>412</sup> We agree with the argument that requiring competitive LECs to convince landlords and customers to permit the construction of redundant inside wiring would substantially impede market entry and competition.<sup>413</sup> Even if permission were obtained, over-building inside wire might be sufficiently expensive and time-consuming to deter potential competitors.<sup>414</sup> Thus, we conclude that access to these subloop elements at technically-feasible interconnection points is necessary for successful competition by facilities-based competitors.<sup>415</sup>

217. Second, carriers need unbundled subloops to serve subscribers currently served by IDLC loops. IDLC technology allows a carrier to "multiplex" and "de-multiplex" (combine and separate) traffic at a remote concentration point, or remote terminal, and to deliver the combined traffic directly into the switch, without first separating the traffic from the individual lines.<sup>416</sup> In such cases, competitors generally

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<sup>410</sup> Illinois Commission Comments at 14-15 (stating that subloop unbundling, which allows competitive LECs flexibility in self-provisioning segments of the loop, allows them to provide their own facilities where construction is uncomplicated, and tie those facilities to the incumbent LEC's plant.); Texas PUC Comments at 15 (stating that subloop unbundling would promote development, technological advancement, and new types of service.)

<sup>411</sup> Depending on the specific architecture, this interconnection point might be at the pedestal, the NID, the MPOE, or any other accessible terminal.

<sup>412</sup> See, e.g., OpTel Comments at 7-8; Teligent Comments at 7-8; WinStar Comments at 2-3, 5-7.

<sup>413</sup> See, e.g., RCN Comments at 21-22. Because landlords and subscribers may reasonably object to the disruption of installing duplicative wiring, we reject GTE's argument that the existence of a "robustly competitive" market in electrical contractors may be interpreted to mean that withholding access to the incumbent's inside wire would not impair competitors' ability to offer services. GTE Comments at 90.

<sup>414</sup> See, e.g., KMC Comments at 22; WinStar Comments at 6.

<sup>415</sup> See, e.g., OpTel Comments at 7-9; Teligent Comments at 7.

<sup>416</sup> The device which accomplishes both the mixing of signals bound for the central office, and the separation of signals bound for subscribers, is a "multiplexer." See generally MCI WorldCom Comments at 44-45 (Copper wire runs from the customer premises to a remote terminal, from where the traffic is no

cannot access IDLC loops at the incumbent's central office.<sup>417</sup> In order to reach subscribers served by the incumbent's IDLC loops, a requesting carrier usually must have access to those loops before the point where the traffic is multiplexed. That is where the end-user's distribution subloop can be diverted to the competitive LEC's feeder, before the signal is mixed with the traffic from the incumbent LEC's other distribution subloops for transport through the incumbent's IDLC feeder.<sup>418</sup> Accordingly, we find that denying access at this point may preclude a requesting carrier from competing to provide service to customers served by the incumbent's IDLC facilities. This would particularly affect consumers in rural areas, where incumbent LECs use the greatest proportion of DLC loops.<sup>419</sup>

218. Third, competitors seeking to offer services using xDSL technology need to access the copper wire portion of the loop.<sup>420</sup> In cases where the incumbent multiplexes its copper loops at a remote terminal to transport the traffic to the central office over fiber DLC facilities, a requesting carrier's ability to offer xDSL service to customers served

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longer transported on its own channel, but rather is transported over shared channels.).

<sup>417</sup> But see MCI WorldCom, *Unbundling Digital Loop Carriers*, at 11-15 (March 1999). MCI WorldCom states that there are four ways that competitive LECs may gain access to IDLC subscribers: (1) Multiple Switch Hosting; (2) Integrated Network Architecture; (3) Digital Cross Connect Grooming; and (4) Side Door Grooming. We note, however, that Multiple Switch Hosting is available only on the newest IDLC systems (Telcordia GR-303) and accommodates only a few competitors; Integrated Network Architecture appears to be cost-effective only for competitive LECs with substantial market penetration, and also works only for GR-303-compatible systems; Digital Cross Connect Systems require all loop signals, including signals for loops retained by the incumbent LEC, to pass through the DCS system for processing, and is therefore very expensive; and MCI WorldCom agrees that Side Door Grooming can only be done for a few lines per remote terminal. Thus, despite their future potential, these methods do not now substantially reduce the competitive LECs' need to pick up IDLC customers' traffic before it is multiplexed.

<sup>418</sup> In the *Local Competition First Report and Order*, the Commission concluded that incumbent LECs must provide competitors with access to unbundled loops, regardless of whether the incumbent LEC uses IDLC technology, or similar remote concentration systems, for the particular loop sought by the competitor. In that Order, the Commission noted that if incumbent LECs were not required to unbundle IDLC-delivered loops, end users served by such technologies would be effectively deprived of competition for their business, and incumbent LECs would be encouraged to hide loops from competitors through the use of IDLC technology. The Commission also found that it is technically feasible to unbundle IDLC-delivered loops through use of a multiplexer to separate the unbundled loop(s) prior to connecting the remaining loops to the switch. *Local Competition First Report and Order*, 11 FCC Rcd at 15692, para 383. In the three years since the *Local Competition First Report and Order*, however, such methods have not proven practicable. Competitors are not yet able economically to separate and access IDLC customers' traffic on the wire-center side of the IDLC multiplexing devices. See Level 3 Comments at 17-18; NorthPoint Comments at 16-18; Prism Comments at 21; RCN Comments at 22.

<sup>419</sup> See, e.g., MCI WorldCom Comments at 44-45. (More than 20% of loops use DLC technology, and the percentage will only increase over time.). MCI WorldCom Reply Comments at 45 (More than half the wire centers in the United States (10,967 out of 20,637) – the majority in rural areas – serve under 2000 lines. In these rural areas, about half the loops are provisioned over DLC). See also Choice One Joint Comments at 21; CoreComm Comments at 34.

<sup>420</sup> See, e.g., Covad Comments at 33-34, 39-41.